

Application Serial No. 10/534438
Office Action Dated 12/15/2006

Amendments to the Drawings:

Please insert — Prior Art— centered and below the label FIG. 13 as shown.

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REMARKS

In response to the Examiner's Detailed Action mailed 15 December 2006, Applicants submit the following amendments and remarks. Figure 13 is amended. Claim 1, 17 and 18 are amended; claims 7-10 are amended editorially. Applicants have not added new matter; support for the amendments to claims 1, 17 and 18 are given in the originally filed specification on page 11, line 9. Claims 1-16 are pending.

Figure 13 is amended to insert the phrase "Prior Art" as requested by the Examiner.

Claims 7-10 are amended editorially to remove the rejection of the claims under 35 U.S.C. §112, second paragraph. It is believed that claims 7-10 are now allowable.

Applicants traverse the rejections of claims 1-7 and 11-16 as being obvious over U.S. Patent No. 6,371,664 B2 to Takahashi et al. (Takahashi '664). Takahashi '664 does not disclose or suggest that the adhesive layer is positioned within an inside of the first groove so as to be in contact with a surface of a wall of the first groove, as required by claim 1. Takahashi '664 specifically states at column 13, lines 55-59 that "the discharge groove 35 has the function of guiding an adhesive that flows into it ... to the outside" Figures 8 and 14 explicitly show that the adhesive layer does not remain in the groove 35; the adhesive has been guided outside. Having an adhesive within the groove 35, moreover, would interfere with filling the groove with silicone gel, a primary feature of Takahashi '664.

Claim 1 requires a laser module with an optical waveguide device having adhesive within the grooves. Takahashi '664 provides an optical coupling for a fiber optic cable to a semiconductor laser. The principle that a "change in size is generally recognized as being within the level of ordinary skill in the art" is not applicable in this case. In fact, in the specification on page 2, line 22 through page 3, line 28, Applicants discuss the difficulties of miniaturizing a larger prior art semiconductor laser and waveguide, as set forth in Applicants' Figure 13. Applicants at page 15, lines 17-18 of the originally filed specification state that the "the outgoing end face of the semiconductor laser and the incident end face of the SHG device normally are coupled directly with a space of about 0 μ therebetween" and these precise tolerances between the

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semiconductor laser and the optical waveguide device are maintained, even through a heating step because of the adhesive positioned within the grooves. Applicants further disclose at page 21, lines 13-23, that a displacement amount of 1 micrometer or more may exceed the tolerance for the displacement of the luminous point of blue light double-layered disc but when the waveguide device is secured as claimed, the displacement of the luminous point is suppressed and excellent signals can be obtained. It is also recognized in the art that the "necessary accuracy ... for fiber-detector coupling is ± 2 micrometers [as in Takahashi '664] in contrast to a fiber-waveguide coupling which requires a reproducible accuracy of the process better than 0.5 micrometers [as in Applicants' disclosure]." See the attached Abstract of Zurhelle et al., "COUPLING STRUCTURES FOR ACTIVE AND PASSIVE INTEGRATED OPTOELECTRONIC COMPONENTS AND CIRCUITS ON SILICON" Proc. SPIE, Vol. 2397, pp. 666-677 (April 1995). Takahashi '664, on the other hand, states at column 5, lines 4-11 that bubbles might be generated between the front incidence surface of the optical and the semiconductor laser – a gap of about 40 to 50 μm that is likely to generate bubbles when heated repeatedly. Thus, Applicants' specification and the Zurhelle reference both teach that miniaturization is not simply a matter of making the components smaller.

Another reason Takahashi '664 does not disclose or suggest an adhesive in contact with a surface of a wall of the first groove is that Takahashi '664 attempts to solve a very different problem from that solved by the claimed invention. Takahashi '664 is trying to eliminate the problems resulting from bubbles created by humidity within a silicone gel filling surrounding and within the gap between the laser and the optical fiber. The problems of misalignment and optical decoupling resulting from thermal expansion of an ultraviolet-cured adhesive were not even realized by Takahashi '664, and are small when contrasted with the generation of bubbles in a silicone gel. Recall that, in Takahashi '664, the excess adhesive is guided outside, so the issue of misalignment resulting from expansion and repeated heating of the adhesive is not so critical; instead the repeated heating generates water bubbles within the silicone gel. With Takahashi '664, the distance may fluctuate for each manufacturing process and become larger than the dimensions of the waveguide devices and the predetermined limits as claimed in claims 2, 3, and 11-14. If so, then there is a high likelihood of

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coupling misalignment between the semiconductor laser and the optical waveguide, resulting from distortion of the adhesive because of heating.

Applicants amend the withdrawn claims 17 and 18 to include the limitations of independent claim 1, now believed allowable.

Applicants request the Examiner to allow not only claims 8-10, but also to allow claims 1-7 and 11-16 based on the amendments and the remarks above. Applicants further request the Examiner to withdraw the restriction requirement and reinstate claims 17-20. Should any issues remain, the Examiner is encouraged to telephone the attorney listed below.



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Respectfully submitted,

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